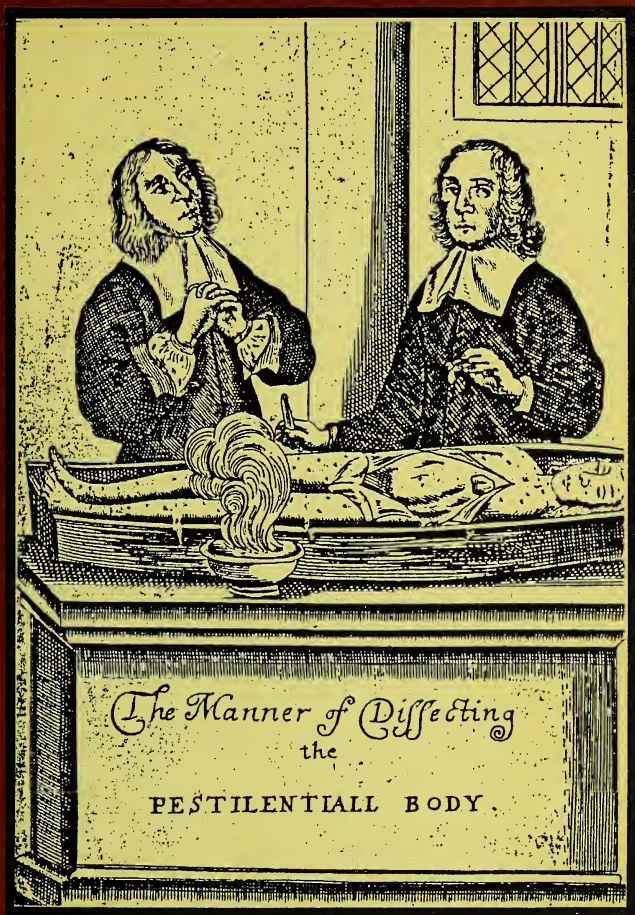


# The Pest Anatomized

*Five Centuries of Plague in Western Europe*



AN EXHIBITION

at the  
WELLCOME COLL. Institute for the History of Medicine

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# ***The Pest Anatomized***

*Five Centuries of Plague in Western Europe*

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T H E   P E S T   A N A T O M I Z E D

Five Centuries of Plague in Western Europe

An exhibition at the  
Wellcome Institute for the History of Medicine  
183 Euston Road, London NW1 2BP

4 March to 24 May 1985  
Monday to Friday 9.45am to 5.15pm





# Regimen zu deutsch Magistri philippi Culmachers vō ifger

wider die grausamen erschrecklichen Törlichen  
pestelentz. von vil grossen meistern gesamelt auß-  
gezogen: do durch sich ein mensch zu pestelentz  
zeit: nicht allein enthalden. Sunder auch wol  
gefreyen kan: gegeben allen menschen zu sundern  
nutz vnd grosser woltat.



The title page of Philippus Culmacher, Regimen... wider die... Pestelentz.  
Leipzig, c 1495.

### Acknowledgements

The exhibition has been organised by Richard Palmer with the help of colleagues, especially Christine English and the staff of the iconographic and conservation departments. Thanks are due to the Wellcome Museum of Medical Science for contributing cases 17-18 and the accompanying text. Grateful acknowledgement is also made for the loan of exhibits from the Guildhall Library, the Royal Society of Medicine, and the Wellcome Museum of the History of Medicine at the Science Museum (hereafter W.M.H.M.). All exhibits are from the Institute's collections unless stated otherwise.



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The Black Death of 1348 opened a new era in the history of Europe, during which its population was continuously ravaged by plague. Not until the last quarter of the seventeenth century was Western Europe free of the disease, and even after this alarming outbreaks at Marseilles in 1720, Messina in 1743, and Malta in 1813 were reminders of the continuing danger. Commercial and colonial links with areas where plague still flourished ensured that the disease remained a concern to European governments at the end of the nineteenth century, when scientific research at last began to unravel the problems associated with its epidemiology.

During these centuries plague was a constant threat. It was feared with an intensity not felt for any other disease, 'none being able to match it for violence, strength, uncertainty, subtlety, catching, universality and desolation', as Thomas Dekker wrote in 1630. Thousands could die of smallpox almost without comment. But the least rumour of plague could cause panic, and the flight of townspeople to the countryside. Fear sprang not so much from dread of the disease itself, though its symptoms, and the sufferings of its victims, were dire enough, but from the shock of seeing the world overturned by the enormity of a full scale epidemic. Some 50,000 Venetians died in the plague of 1575-7, about one in three of the population, and like totals were recorded at Marseilles in the years 1720-21 and at Messina in 1743. Mortality on such a scale could tear at the fabric of society. Contemporaries recorded their horror at seeing the sick abandoned by their families, carried away to the pest houses, or shut up by the authorities in their homes. They witnessed the bodies brought naked to the doors to be borne away on the pest carts, the slaughter of dogs and cats in the streets, the erection of gallows to deter offenders against the plague orders, the shame of young girls forced to display their most intimate parts to the hard-faced scrutiny of the searchers, and the cruelty of country people to the runaways from the towns. Sometimes violent social reactions were the result. The search for scapegoats led to the burning of Jews in 1348, and the torture and death of the so-called 'anointers' during plague in Milan in 1630, while riots broke out during the Moscow plague in 1771. Equally, plague produced instances of heroic dedication to duty, personified in the work of San Carlo Borromeo during the epidemic in Milan in 1576.

Despite the overwhelming problems which the plague presented, Western Europe did not submit to it with resignation. For centuries doctors tried to understand its nature and the manner in which it spread, while health authorities struggled to control it and limit its effects. The difficulties in the way of understanding plague were formidable. The disease could take several forms. Alongside bubonic plague, the clinically distinct pneumonic form of the disease contributed to mortality in the fourteenth century. Throughout the centuries contemporaries also noted that sudden deaths from plague sometimes occurred before any external symptoms had a chance to appear - a phenomenon now known as septicæmic plague. Medical writers on the disease were fully aware that plague epidemics waxed and waned according to climatic conditions, and looked, for instance, to a cold winter to end an outbreak. This encouraged them to accept the Hippocratic view that epidemics represented a disease of the environment, a rotting of the air in humid conditions. At the same time, they noticed that isolation sometimes saved a community or institution from the disease. How could this occur if the air were corrupt? The debate as to whether plague was contagious was to continue until the last years of the nineteenth century.

Attempts to control the disease did not await the outcome of such debates. Between the fourteenth and eighteenth centuries Western Europe fought to overcome the disease with ever increasing resources and determination. The plague involved governments more fully than ever before in matters of public health. The scale of their enterprise, carried into effect in towns and villages throughout Western Europe, has probably never been equalled. In the course of the effort new methods of dealing with disease were introduced - lazarettos, quarantine, bans on access to infected areas, cordons sanitaires, health passes, the removal of people at risk to safer environments, and the use of new techniques of disinfection. Plague also stimulated governments in other directions, to improve standards of public hygiene, to use statistical methods of monitoring disease patterns (through civic censuses and registers of deaths), and to take measures against poverty and begging, which were associated with the disease.

In the last quarter of the seventeenth century plague more or less disappeared from Western Europe. Many arguments have been brought forward to account for its disappearance. One thing, however, seems clear. The huge mortality which occurred when plague was brought by ship to Marseilles and Messina in the eighteenth century shows that Europe had not developed an immunity to the disease. Plague remained as lethal as before, if once it eluded the health precautions. A select committee of the House of Commons reported in 1819 that there was no reason to suppose that plague could not occur again in England. Constant vigilance was still required, all the more so after the epidemic in Hong Kong in 1894 spread plague to all parts of the world. In the succeeding decades of this 'third pandemic', well over ten million deaths resulted from plague, including those which occurred in minor outbreaks in England, France and Portugal. Although plague is now associated in popular consciousness with the Middle Ages, there were more than one hundred thousand human cases in the decade up to 1974. Though checked by active public health measures and effective medical treatment, plague continues to be alive and well in the modern world.

## CASE 1. THE ROTTEN AIRE

Medical ideas of epidemics were profoundly influenced by Hippocrates and Galen. According to classical theory, an epidemic resulted from a corruption of the air caused by prolonged warm, humid weather, or by vapours arising from stagnant marshes, rotting corpses, or other filthy matter. 'It may come', wrote Simon Kellwaye in 1593, 'by some stinking doonghills, filthie and standing pooles of water and unsavory smelles.'

Since the danger lay in breathing corrupt air, doctors advised flight from towns affected by plague. Where flight was impossible, they recommended attention to diet and life-style, along with measures to improve the air. Herbs and fragrant flowers were scattered around the rooms, or used with frankincense as fumigants. In the streets bonfires were sometimes burned to dry the air, while passers-by carried pomanders, or sponges dipped in vinegar, and held them to the nose.

Thomas Dekker wrote in 1603 of people in the London streets 'muffled up and downe with Rue and Wormewood stufte into their eares and nostrils, looking like so many Bores heads stuck with branches of Rosemary, to be served in for Brawne at Christmas.'

'Whole houtholds, and whole streets are stricken,  
The sick do die, the sound do sicken,  
And Lord have mercy upon us, crying  
Ere Mercy can come forth, th'are dying.  
No musick now is heard but bells,  
And all their tunes are sick mens knells;  
And every stroake the bell does toll,  
Up to heaven it windes a soule.'

Text from Thomas Dekker, Newes from Graves-ende. London, 1604.

Isaac Judaeus, De febribus. English MS., early fourteenth cent.

The plague treatise, 'Causa pestilencie est aer putridus et corruptus...', was added to the end of this manuscript in the late fourteenth century. It explains the causes of plague exclusively in terms of corrupt air, and advises on how to predict the approach of an epidemic from states of the atmosphere and weather conditions.

Western MS. 370, ff. 71v.-72r.

Regimen preservativum a pestilentia. German MS., late fifteenth cent.

The anonymous author of this treatise offers some widely heeded advice: 'Tribus canonibus sapientium medicorum securamur a pestilentia, videlicet, Cito exire, remote abire, tarde redire'. (By three rules we may be kept safe from pestilence, ie. Leave quickly, go far away, and don't be in a hurry to come back).

Western MS. 283, pp.46-53.

Runaways fleeing from plague in London. Photograph from a broadsheet, A looking-glasse for city and countrey. London, 1630. Reproduced from F.P. Wilson, The plague in Shakespeare's London. Oxford, 1927.

Johannes Jacobi (d. 1384), De preservatione a pestilentia. German MS., late fifteenth cent.

The importance of a healthy diet and lifestyle in time of plague are stressed here, as in many similar treatises. Foods thought liable to rapid decay were



to be avoided. Fruits were to be shunned for this reason, except for acidic ones like sharp cherries. Exercise was recommended provided that it was light, but bathing and sexual intercourse were thought dangerous, since they might open the pores to the corrupt air.  
Western MS. 78, ff. 33v.-36r.

Luis Lobero de Avila, Vanquete de nobles cavalleros... e trata del regimiento curativo e preservativo de las fiebres pestilenciales e de la pestilencia.  
Augsburg, 1530.

The first edition of this work by Luis Lobero de Avila, doctor to the Emperor Charles V, includes a remarkable series of fourteen woodcuts, mainly by Hans Weiditz. Most of them illustrate medical and surgical remedies for plague. Folio 37 shows a doctor abandoning a patient who has ignored medical advice and eaten fruit and other bad foods.

Orders ...to be executed ... in such townes... as are... infected with the plague. Also, an advise set downe by the best learned in physick... for the preservation... from the plague. London, 1603.

The College of Physicians of London was called upon during each epidemic to provide advice on the prevention and cure of plague. The College's directions grew more elaborate but did not change substantially throughout the seventeenth century. The text shown here begins with methods of correcting the air by burning herbs and vinegar. Later versions have receipts for perfumes and pomanders as well as preservative medicines.

Certain necessary directions, as well for the cure of the plague, as for preventing the infection. London, 1636.

Thomas Thayer argued in his A treatise of the pestilence (London, 1603) that 'the uncleane keeping of the streetes, yeelding as it doth noisome and unsavory smelles, is a meanes to increase the corruption of the aire'. Advice of this kind provided a motive for improving street cleaning and public hygiene, as in the London plague orders which are exhibited here.

Johannes de Ketham, Fasciculus medicinae. Venice, 1495.

The Fasciculus circulated widely in manuscript and printed form. It includes a plague treatise, Consilium pro peste evitandi, written by Pietro da Tossignano in 1398. In the accompanying illustration a doctor holds to his nose a sponge, probably soaked in vinegar, while he takes the pulse of the plague patient. Another figure holds a container for a urine flask, though many writers on plague concluded that uroscopy was of no use in diagnosing this disease.

#### Pomanders

Pomanders could be carried or worn on a chain, providing a sweet, comforting fragrance. They might include separate compartments for individual herbs and spices. The eight-segmented pomander exhibited was meant to contain, amongst other things, rosemary, rue, nutmeg and cinnamon. The six segments of the other pomander, made of silver in the seventeenth century, bear portraits of kings and queens.

W.M.H.M., inventory numbers A.629412-3.

#### Vinaigrette

The vinaigrette served the same function as the pomander. The example exhibited, made of silver gilt, was hallmarked in London in 1798. Though made much later, it corresponds to items used in England in earlier centuries.  
W.M.H.M., inventory number A.641495.



#### An orange with cloves

Plague treatises were careful to offer a variety of prophylactics and remedies, the contents of which, from emeralds to every-day herbs, suited variously the rich and the poor. An alternative pomander, recommended by John Woodall in The surgeons mate (London, 1639), was 'a good Sivill orange stuck with cloves'.

'One with a peece of tasseld well tarr'd Rope  
Doth with that nose-gay keepe himselfe in hope;  
Another doth a wispe of worme-wood pull  
And with great Judgement crams his nostrils full;  
A third takes off his socks from 's sweating feete,  
And makes them his perfume along the streete:  
A fourth hath got a pownc'd Pommander box,  
With woorme-wood juice, or sweating of a Fox.'  
Text from John Taylor, The fearefull Sommer. London, 1625.

#### Fumigating torch. Copy of a seventeenth century original.

Herbs were burned in the metal container, enveloping the bearer in a haze of protective fumes.

W.M.H.M., inventory number A.629411.

#### Rosemary and pot-pourri.

Rosemary was one of the herbs widely used in the prevention and treatment of plague. Dekker noted in the London plague of 1603 that 'the price of flowers, hearbes and garlands rose wonderfully, in so much that rosemary which had wont to be solde for 12 pence an armefull, went now for sixe shillings a handfull.'

### CASE 2. BOTCHES, CARBUNCLES AND GOD'S MARKES

The symptoms of bubonic plague were vividly described by writers such as Girolamo Mercuriale (1577), Simon Kellwaye (1593), and Stephen Bradwell (1636). While varying from case to case, they included fever, headache, thirst, sleeplessness (but, sometimes, deep sleep), weakness, disturbances of the pulse, nausea, vomiting, diarrhoea, delirium, frenzy, and nosebleeds. Particularly clear diagnostic signs were buboes (botches) in the armpits, groins, or beneath the ears, and carbuncles (or blains). The latter appeared on various parts of the body, first as small vesicles, and later as hard crusty sores of a charred appearance. Sometimes there were red, blue or black spots (God's marks or tokens). Mercuriale recorded that in most cases death occurred within four or five days.

Treatment was by regimen, drug therapy, and surgical intervention. The principal aim was to expel the plague poison through sweating, blood-letting, purging (and, sometimes, vomiting), and through the issue of pus from artificially induced blisters. Buboes were softened with maturative plasters, and opened by lancing, or by the application of hot irons (the actual cautery) or caustics. Carbuncles were cauterised.

Thomas Lodge, A treatise of the plague. London, 1603.

While many doctors fled from London on the outbreak of plague, Thomas Lodge remained behind. Three thousand were dying each week from plague when his book, containing a detailed account of the symptoms and treatment of the disease, went to press. Lodge survived this epidemic, but died during a subsequent outbreak, in 1625.

### Photographs of plague patients

From the fourteenth century to the present day, descriptions of the symptoms of plague have reflected a continuity of clinical experience. These photographs were taken in Rio de Janeiro, probably in the outbreak of 1900. They display the principal symptoms described by European writers of earlier centuries. The originals, from which these copies were made, were intended to illustrate a paper by Camillo Terni. They came to the Wellcome Institute amongst the papers of Sir James Cantlie.

William Kemp, A brief treatise of the ... pestilence. London, 1665.

It was thought that noxious humours could be evacuated through artificially induced blisters or issues, from which pus was continually allowed to drain. Kemp argued that 'you were better to have your skin broken with a launce or cautery, than with a botch or blain; and you will find it lesse cost, pain, or trouble, to go to a chyrurgeon to make an issue, than to have him come to you to dress a carbuncle.'

### Enema syringe

Simon Kellwaye wrote in his book on plague in 1593 that 'there is not a greater enimie to the health of our bodies than costivnes'. Laxatives, suppositories, enemas (or clysters), and purging pills and powders were much in use in time of plague. The syringe exhibited is English. It dates from the eighteenth or nineteenth century, but corresponds to similar items used during the era of plague in England.

W.M.H.M., inventory number A.626702.

Hieronymus Brunschwig, Medicinaris. Das Buch der Gesundheit [and other works]. Strasbourg, 1505.

This work is illustrated with a magnificent series of woodcuts. Folio 152v. is thought to show a patient suffering from plague, gesturing to the site of a bubo in his right armpit. The same woodcut appeared in an earlier publication by Brunschwig, a plague treatise entitled Liber pestilentialis de venis epidemie. Das Buch der Vergift der Pestilantz, (Strasbourg, 1500).

Pietro d'Abano, Trattato delli veleni. Italian MS., late fifteenth cent.

This treatise is followed by a series of plague remedies, and notes on treatment. At the outset of the disease the patient was to be well covered up in bed, in a room with a fire, and left to sweat for seven hours.

Western MS. 615, ff. 62v.-93v.

Luis Lobera de Avila, Vanquete de nobles cavalleros... Augsburg, 1530, f.77.

In this illustration the plague patient has been put to bed, and is being covered with blankets to induce sweating. At the same time a physician is examining his urine.

Photograph, from the volume displayed in case one.

Ein kurtz Regiment Wie sich zu Zeiten der Pestilantz zu halten sey. Nuremberg, 1533.

This is one of a number of treatises which include a chart showing sites for bloodletting in cases of plague. The sites are related to places where it was thought buboes might appear. An inguinal bubo (located in the groin) would thus be treated by letting blood from the saphenous vein below the ankle. In each case the aim was to draw the plague poison away from the vital organs, and to expel it at the body's extremities.

Pietro Paolo Magni, Discorsi intorno al sanguinar i corpi humani. Rome, 1584. Magni's splendid barber's manual includes illustrations of bloodletting from veins in the forehead, below the tongue, and in the neck, arms, hands, legs and feet. Page 75 shows a woman being bled from the saphenous vein below the left ankle. Many doctors insisted that bloodletting in plague cases was to be undertaken only in the early stages of the illness, when it was to be performed as a matter of urgency. 'Two hours delay in bleeding', wrote Thomas Thayre in 1603, 'may be the cause of death.'

#### Bleeding bowls

The horn bowl possibly dates from the seventeenth century. The silver one is a later example, made in Philadelphia c 1770.

W.M.H.M., inventory numbers A.69821 and A.29818.

Luis Lobera de Avila, Vanquete de nobles cavalleros... Augsburg, 1530, f.76. Cupping and scarification was a more gentle form of bloodletting than opening a vein. It was recommended for the aged, and where the patient's strength was low. Cups were also used for other purposes, for instance in helping to draw out the plague bubo.

Photograph, from the volume displayed in case one.

Pietro Paolo Magni, Discorsi sopra il modo di sanguinare. Rome, 1586.

Magni gives a clear account of how cupping and scarification were to be performed. After the blood had been drawn to the surface of the skin by a vacuum created inside the cup, the barber made a series of incisions, or shallow cuts, which were allowed to bleed. This is illustrated on page 103 of the treatise.

#### Scarificator

Scarification could also be done mechanically. The instrument exhibited, which has sixteen blades or lancets, was made in Vienna in the eighteenth century by J.J. Fischer.

W.M.H.M., inventory number A.626577.

Set of cupping instruments. Eighteenth or nineteenth cent.

Amongst the instruments are a spirit bottle and a torch, which were used to heat the air inside the cups. A vacuum was formed as the air subsequently cooled and contracted, which drew the blood to the surface of the skin. The other instruments are the cups and the scarificator.

W.M.H.M. inventory number A.41341.

Surgeon lancing a bubo. Photograph from a woodcut in Hans Folz, Spruch von der Pestilenz. Nuremberg, 1482.

Buboes were seen as nature's way of throwing off the plague poison from the vital organs. Their maturation was encouraged with softening plasters. When ripe, the buboes were opened with a lancet, or, as Thomas Lodge preferred, with cauteries.

Long-handled cautery (copy).

This cautery is of unusual length, for use in treating cases of plague. Buboes and carbuncles might both be treated with the hot (or actual) cautery. W.M.H.M., inventory number A.629401.

### CASE 3. PHYSICK FOR THE SICKNESSE

In treating the plague, doctors employed an infinite variety of medicines for purging (by pills, suppositories or clysters), and for inducing sweating and vomiting. In addition there were medicines to relieve particular symptoms, such as opiates to induce sleep, and juleps to relieve thirst.

Since plague was believed to act on the body like a poison, antidotes had a particular importance in therapy. Foremost amongst them were theriac and mithridatum. These were amongst the most elaborate drugs in the pharmacopoeia. Theriac of Andromachus, (or Venice treacle as it was known in England), contained as many as 81 ingredients, including vipers' flesh. In addition, doctors made great use of medicinal earths such as terra sigillata, or its cheaper rival Armenian bole, and they also praised the benefits of unicorn's horn and bezoar stones.

Orthodox medicine met with brisk rivalry from quacks and mountbanks, whose miracle cures found a ready market in time of plague. Thomas Dekker satirised them in 1603 as 'empiricall madcaps ... sucking the sweetenes of silver (and now and then of aurum potable) out of the poison of blaines and carbuncles.'

Collection of medical recipes. English MS., c 1625-82.

This manuscript includes numerous plague remedies, including 'A medecyne for the plague which King Henrye the Eyght did use in ye first yeare of his raigne which healed about eyght thousand persons ye same yeare'. This was a drink, made from rue, feverfew, marigolds, sorrel, burnet, and dragonwort.

Western MS. 674.

Leonhard Fuchs, De historia stirpium. Basle, 1542.

This magnificent hand-coloured copy of Fuchs' famous herbal includes (p. 616) a full-page illustration of Ruta hortensis, or rue. Rue was amongst the herbs most commonly recommended in relation to plague. The College of Physicians of London commended its use in pomanders and nosebags, as well as in drinks and other internal medicines.

Edward Matthew Ward (1816-1879), Pharmacist or quack dead in his shop.

One of a group of illustrations of the great plague in London in 1665. Ink wash on blue tinted paper, heightened with white chalk, 38 x 28 cm. The extravagant claims of quacks, and even of orthodox pharmacists, were a frequent source of satirical comment in time of plague. Rocco Benedetti, who lived in Venice during the plague of 1576-77, wrote that "It was amusing to see posted up certain pharmacists' bills, which declared in bold letters 'Sure preservative against the plague of the excellent so and so'. And at the same time they kept their doors and shops barred, and put the money they touched straight into vinegar in case it was infected. And sometimes it was heard that one of them was dead, along with the excellent so and so of the preservative."

Doctor Burges approoved medicine against the plague, [London?, n.d.]

A typical plague 'remedy' with herbs and spices, theriac (treacle) and mithridatum. The assertions of its efficacy are also typical of the many nostrums which were peddled during plague. This was probably issued as a single sheet but it is here bound among the preliminary leaves of Stephen



Bradwell's Physick for the sicknesse, commonly called the plague, London, 1636. Bradwell, the grandson of the famous John Banister, sold many similar preparations, a 'powder of life', 'plague powder' etc. Bradwell was careful to dissociate himself from the 'Mountebancks', whom he instructed to 'goe quack in the country'.

Pharmacopoea Londinensis. London, 1618.

Theriac was amongst the most highly prized of antidotes. The official pharmacopoeia issued by the College of Physicians of London lists the ingredients of the ancient theriac of Andromachus, and also those of a simpler London theriac, which could be made mainly from local ingredients.

The manufacture of theriac. Woodcut published in works by Hieronymus Brunschwig, including his Liber de arte distillandi (Strasbourg, 1512).

The manufacture of an electuary as complex and prestigious as the theriac of Andromachus required elaborate procedures. It was normally made in substantial quantities, sometimes by several pharmacists in partnership. Colleges of Physicians and even civic officials were involved in checking the ingredients and supervising procedures. Manufacture could become a public ceremony. Francesco Calzolari of Verona, one of the most respected manufacturers, used to put the ingredients on public display, to the sound of trumpets and drums.

Vipers being prepared for medicinal use. Photograph of a woodcut from [Hortus Sanitatis] Le iardin de santé, (Paris, ? 1529). Troches made from vipers' flesh were a central ingredient of the theriac of Andromachus.

Bartolomeo Maranta, Della theriaca et del mithridato. Venice, 1572.

Maranta noted that theriac had never failed as an antidote in antiquity, when its virtues were tested in clinical trials on criminals condemned to death. Like other sixteenth century pharmacists, he strove to recover the authentic classical ingredients necessary to perfect the drug, and to make available its remarkable curative properties.

Drug jar, for theriac of Andromachus

Tin-glazed earthenware, with blue decoration on a white background. Labelled 'Ther. And.'. English, 17th cent.

W.M.H.M., inventory number A.643570 (for similar jars, cf. Crellin, fig. 16).

Theriac stamp. Venetian, 17th or 18th cent.

The stamp was used for labelling theriac containers. It was employed in the Speciaria della Madonna in Campo San Bartolomeo, Venice. The brass relief shows the Madonna and child, with the lion of St. Mark. Venetian theriac was the most prestigious in Europe. W.M.H.M., inventory number A.656705.

Drug jar, for mithridatum

Tin-glazed earthenware, with blue decoration on a cream background. Labelled 'mitridatium'. Dutch, ?eighteenth cent. W.M.H.M., inventory number A.643554 (Crellin, n. 92, fig. 145).

Simon Kellwaye, A defensative against the plague. London, 1593.

The medicinal earths, Armenian bole and terra sigillata, were widely used against the plague. Kellwaye included both in his 'powder to expell the plague and provoketh sweat', along with fragments of precious stones, unicorn's horn, and other simples.

Digging Armenian bole. Photograph of a coloured miniature.

Armenian bole was a reddish earth, whose cold, dry, astringent properties were thought beneficial in cases of plague. The miniature exhibited is one of more than four hundred which are contained in a fifteenth century French version of a popular herbal, Matthaeus Platearius, Circa instans (Western MS. 626).

Terra sigillata

Terra sigillata was an earth made into pastilles, which were impressed with a seal. Although it came mainly from Lemnos, the cross on the examples exhibited suggests that these may have come from Malta.

W.M.H.M., inventory number A.656702.

Bezoar stones

Bezoar stones were calculi formed inside various animals, including, as in one of these specimens, the camel. Introduced into western medicine by the Arabs, they remained in the London pharmacopoeia until the mid-eighteenth century. In 1593 Kellwaye's plague treatise recommended three or four grains a day in scabious water. In the plague of 1665, however, Thomas Hodges discovered that bezoars failed to live up to their reputation. He found that even 40 or 50 grains were entirely without effect.

W.M.H.M., inventory numbers A.635026-7.

Andreas Starck, Von der Pestilenz. Erfurt, 1597.

Followers of Theophrastus Paracelsus introduced a variety of new chemical remedies, largely produced by distilling, for the treatment of plague. Controversy between Galenists and the supporters of chemical therapies was particularly evident in the London plague of 1665, when the supporters of chemistry were led by George Thomson.

#### CASE 4. A WATCHMAN FOR THE PEST

While the attention of doctors was focused on the quality of the air, it became apparent to the public at large that plague was contagious, and that it was spread from place to place by the movement of people and their goods. This opened up real possibilities for plague control on the part of civic and state authorities.

In 1377 the Council of Ragusa, (now Dubrovnik), ordered the quarantine of shipping from plague areas, and in the first half of the fifteenth century a permanent Health Board for plague control was established in the Duchy of Milan. By the end of the sixteenth century the Italian Health Boards were in close cooperation to enforce control over a wide area, and their methods were being steadily adopted throughout Western Europe.

To control the disease, the Boards forbade commercial relations and travel to and from areas affected by plague. They enforced this with check points at ports, bridges, and mountain passes, and by requiring all travellers in time of plague to carry health passes.

When a town became infected, the Boards evacuated infected houses, sending the sick to isolation hospitals, the lazarettos, and the healthy to quarantine centres. The houses themselves were shut up and disinfected, and their contents disinfected or burned. In London, however, the absence of a large plague hospital meant that sick and healthy were confined together in their infected houses, a fate described in 1665 as a 'miserable, noisom, melancholy, close imprisonment, which exposeth the well (shut-up) daily to destruction'.



Duchy of Savoy: plague precautions.

Letter to Carlo Emanuele I, Duke of Savoy (1562-1630), from the Health Board in the eastern part of the Duchy (Magistrat Général ... sur la Sante de là les Monts). The letter deals with precautions during an outbreak of plague in the area. Chambéry, 23 August 1581.  
Western MS. 5138.

Health passes

Health passes (fedi di sanità) issued to Giovanni Francesco Buonamici, of Prato, for various journeys in time of plague. Buonamici was described as aged between 37 and 40, height average or tall, with a dark complexion and a dark brown beard. The passes were issued by the Health Boards of Genoa, Pisa, and Bologna between 1630 and 1632.  
Western MS. 5139/1,3,6.

Sospensione di commercio con tutta la Germania. Printed proclamation by the Health Board of Ferrara, 26 December 1679, banning commerce with the whole of Germany. The ban, brought into force in cooperation with the Health Board of Verona, forbade the movement of people and goods from Germany by land or sea, whether with health passes or without.

Minute book of the Mayor and Aldermen of Kingston upon Hull, 1668-70.

On 28 August 1668 the Privy Council, taking note of plague in Normandy, ordered that no ship from Rouen, Caen and other infected areas was to unload in British ports before quarantine had been performed. On 8 September the local authorities in Hull put these orders into effect, and laid down fines for disobedience.  
Western MS. 3109.

The execution of offenders against the plague orders.

Photograph of a detail from an engraving of plague in Rome in 1656 by G.G. de Rossi (see case 8).

In Italy plague control was enforced with deadly seriousness. As late as 1813, during plague in Malta, an English visitor to Sicily was shown the numerous gibbets set up along the coast. 'That, Sir', he was told, 'is our only defence'.

Minute book of the Health Board of Monza during the plague, 1576-77.

Plague broke out in Monza, part of the Duchy of Milan, in August 1576. Strict control was enforced by the local Health Board. On 10 September 1576 they appointed officers to take a complete census of the town. This became a means of controlling the population during the epidemic. The same officers were to visit their allotted wards every week, and check that every person was accounted for.  
Western MS. 570, especially ff. 25v.-27v.

Orders thought meete by her Maiestie ... to be executed throughout the counties of this realme, in such townes ... as are, or may be hereafter infected with the plague. London, [1588?]

The Privy Council established procedures for the whole country to deal with plague. The inhabitants of infected houses were to be shut up for six weeks and anyone breaking this quarantine was to be punished with the stocks. Officials were to be appointed to view corpses and report on the causes of death, and to watch and provide food for infected houses. Separate burial grounds outside parish boundaries were to be used, and burials were to take place only after sunset. Severe as they were, the orders were humanitarian in intention. Special funds were set up for the relief of the poor and to compensate for infected goods which were burned.

J.V., Golgotha; or, a looking-glass for London. London, 1665.

Despite the severity of sixteenth century epidemics of plague it was not until 1594 that the first London pest-house was built in St. Giles Cripplegate. In 1642 the pest-house serving Westminster was erected in Tothill Fields. Although others were established in the vicinity of London and elsewhere, they could never hold more than a fraction of the infected.

The practice of shutting up houses where the infection was found, immuring the healthy with the sick, was widely condemned. The first houses closed up in London in 1665 were broken open by neighbours, but the authorities nevertheless enforced the system as long as it was practicable. J.V.'s is one of the most strongly-worded contemporary attacks on 'this dismal likeness to Hell, contrived by the Advice of the English Colledge of Doctors'.

Searchers during the great plague of London, 1665. Detail from a contemporary print reproduced in F.P. Wilson, The plague in Shakespeare's London. Oxford, 1927.

'That in or for every parishe there shalbe appointed twoe sober Ancient Woemen, to be sworne to be viewers of the boddies of such as shall dye in tyme of infeccon, and twoe other to be veiwers of such as shalbe sicke and suspected of infeccon: which woemen shall imediatly... make true reporte to the Constable .... They at there going abroade to beare redd wandes, goe neere the Channelles and shunne assemblies'.

Text from the proceedings of the Court of Common Council, Sept. 7, 1592, published in Shakespeare Association, Present remedies against the plague, London, 1933.

Corpse-bearer. From a series of London Cries sold in 1655. Reproduced from F.P. Wilson, The plague in Shakespeare's London. Oxford, 1927.

Plague officers such as searchers, watch-men and bearers tended to be recruited from the less respectable ranks of society. In Thomas Dekker's words 'the poore man is hurried to his Grave by nasty and slovenly Bearers, in the night, without followers, without friends, without rites of buriall'.

View of the manner of burying the dead bodies at Holy-well Mount during the dreadful plague in 1665. Engraving by Charles Grignion after Samuel Wale, c. 1770.

The plague pit at Holywell Mount in Shoreditch was probably known to Defoe, and continued in use as a burial ground long after 1665.

The true copy of all the burials ... within the city of London ... from the 13 of October. London 1603.

The keeping of statistics of disease and mortality was a direct result of the desire to control plague. The Bills of Mortality were compiled by parish clerks and began in plague years in the sixteenth century. The earliest year for which printed Bills of Mortality survive is the plague year 1603. This is a weekly bill for the 13th to the 20th October. They were printed as broadsheets and copies were posted up. Most accounts of the plague record the anxious scanning of the weekly bills.

Guildhall Library, London, Broadside 6.99.

## CASE 5. LAZARETTOS

Although in England their development was slow, lazarettos, or pest houses, were widely used on the Continent to house the sick in time of plague, and to quarantine merchandise or travellers from plague areas. The earliest permanent lazaretto was founded on an island in the lagoon of Venice in 1423. Others were built outside many Italian towns in the fifteenth century.

During epidemics scenes of the utmost horror were witnessed at the lazarettos. 'A slaughter house for mankind' was the description applied to the lazaretto of Parma in 1448. The Lazzaretto Vecchio of Venice was described in 1576 as the Inferno, where, amid stench and groans, patients seized with frenzy ran through the wards, shrieking with the voices of the damned. At the same time the lazarettos were often the only places where nursing or medical care were to be had. Later lazarettos were designed with more particular regard to their commercial role in the quarantine of travellers and the disinfection of merchandise.

Leper Hospital of Saint Ladre, Pontoise, France.

Agreement for the admission of a leper, 17 May 1412. The document relates the terms of admission, including the goods and utensils which the leper was to bring with him.

Leper hospitals were built outside the walls of a great many medieval towns. The isolation of lepers was based on Old Testament ordinances (Leviticus Ch.13), and it was frequently the responsibility of Church authorities. In northern Italy, however, leper hospitals were in lay control. The concern of Italian town councils with leprosy led on to their work in isolating the plague sick. As leprosy declined the hospitals of San Lazzaro, as leper hospitals were often known, gave way to the lazarettos. The buildings and funds of the leper houses were sometimes re-assigned for the new purpose.

Western MS. 5133.

The Lazzaretto Vecchio of Venice. Photograph from the plan published in John Howard, An account of the principal lazarettos in Europe, (Warrington, 1789).

The first permanent plague hospital was founded in 1423 on the island of Santa Maria di Nazaret (formerly a hospice for pilgrims) in the Venetian lagoon. From the name of this island the word 'lazaretto' took its derivation, along with the alternative form 'nazaretto' which was common in fifteenth century Italy. A second lazaretto, the Lazzaretto Nuovo, for close contacts of the plague sick, was opened on another lagoon island in 1468.

Letter book of Ludovico Cucino, doctor to the Health Board of Venice.

Cucino was employed during the plague in Venice of 1555-57. He served mainly in the Lazzaretto Vecchio, treating the sick, examining corpses sent to him by the Board for post-mortem diagnosis, and making anatomical preparations in his spare time. The letter exhibited (f.85r.) was written by Zorzi Nassin, Prior of the Lazzaretto Nuovo, on 23 April 1557. Nassin was sending his wife Cecilia, who had caught the plague, to Cucino for treatment. The letter was short. 'Tears', wrote Nassin, 'allow me to write no more.'

Western MS. 223.

Maurice, de Toulon. Traité de la peste, recueilli des meilleurs auteurs... et enrichi de remarques... par le Sr. Manget. Geneva, 1721.

The frontispiece shows the costume worn by doctors and others visiting cases of plague. It was made of Morocco leather, with a mask fitted with crystal lenses. The long beak was filled with perfumes. This costume came into use on the Continent in the seventeenth century.

Plague mask, used in the Lazzaretto Vecchio of Venice. Photograph.

This mask, made of oil cloth, with a bronze beak, was moved from Venice to the Museum of Hygiene in Rome. Its present whereabouts are not known.



Giovanni Filippo Ingrassia, Informatione del pestifero, et contagioso morbo, il quale afflige et have afflitto questa città di Palermo...nell'anno 1575 et 1576. Palermo, 1576-77.

This work by the Protomedico of Sicily includes an illustration and description of the Lazzaretto della Cubba in Palermo. The figures numbered 2 and 3 show a cart carrying an infected person, and a chair for transporting the sick. Further along, numbered 6, is a doctor with two guards on his way to the lazaretto, and 8, on horseback, is the Protomedico, Ingrassia himself, with the governors of the hospital.

The lazaretto at Genoa. Engraved plan from John Howard, *An account of the principal lazarettos in Europe*. Warrington, 1789.

View of the lazaretto of Genoa. Engraving from Howard, *An account of the principal lazarettos in Europe*, Warrington, 1789.

John Howard (1726-90), advocate of prison reform, was probably the only traveller ever to undergo quarantine in the Venetian lazarettos purely for research purposes. In order to obtain first-hand experience of quarantine he travelled to Venice from Smyrna on a ship with a foul bill of health and was confined for 42 days. He did however improve his rooms in the lazaretto, white-washing the walls, which he thought had not been cleaned 'probably for half a century.' Howard argued that a lazaretto should be established in England in the interests of British commerce.

The island lazaretto of Rome during the plague of 1656. Photograph of a detail from the engraving by G.G. Rossi (see case 8). The lazaretto of San Bartolomeo, on an island in the Tiber, was used for the plague sick. Corpses were removed in boats for burial outside the city.

Ordini stabiliti in virtù di terminatione dell' illustriss. e eccellentiss. signori Sopraproveditori e Proveditori alla Sanità de' 19 settembre 1644 circa quello che si deve osservare nelli lazareti per li sborì di robbe e mercantie. Venice, [1644].

The Italian Health Boards evolved an elaborate system for disinfection in time of plague. Infected houses were sealed up and fumigated with sulphur, pitch and other substances. Infected textiles (if they were not burned) were boiled, submerged for a period in running water, or buried in sand. Merchandise passing through the lazarettos merely for quarantine was dealt with by airing. Wool, linen, silk, cotton and similar goods were unpacked and exposed to the air for a period. Handlers were required to handle all the items regularly with bare hands, and even to sleep amongst the carpets. If a handler fell sick during the quarantine period, the process began over again. There were many editions of the orders for airing goods in the Venetian lazarettos, including an English version published in 1752.

Fumigation of books and papers during the plague in Rome, 1656. Photograph of a detail from the engraving by G.G. Rossi (see case 8).

The fumigation of letters was widely practised by the seventeenth century. A letter, enclosing a bill of mortality, sent from London during the plague of 1625, records 'I had no mind to send you a bill, finding of late that there is danger in them... howsoever, the carrier perfumes them all'.

## CASE 6. PLAGUE IN MILAN

After the mid-sixteenth century, plague ceased to be endemic in Italy, perhaps as a result of the vigorous efforts at plague control. Nevertheless on several occasions, in the 1570s, 1630s and 1650s, the peninsula was again invaded by the disease. In many towns the mortality which resulted was much higher than in any plague since the fourteenth century.

Milan, where plague control had been pioneered, suffered two outbreaks at this time. Between 1576 and 1578 plague claimed some 18,000 victims in Milan. This was the peste di San Carlo. It took its name from Carlo Borromeo, Archbishop of Milan, whose heroic self-sacrifice during the epidemic contributed to his canonisation.

The second plague was the peste Manzoniana, made famous by Manzoni's I promessi sposi. This epidemic, which ravaged Milan in 1630 and 1631, is thought to have caused 86,000 deaths, some three-fifths of the city's population.

Carlo Borromeo giving communion to the plague victims.

This painting is a cabinet-reduction of a life-size work by Pierre Mignard now in the Musée de Narbonne. The original was painted in Rome, during the pontificate of Alexander VII (1655-67). Since the walls of Milan can be seen in the background, the picture is probably meant to represent a visit by Borromeo to the lazaretto.

Although only 38 when the plague broke out in Milan in 1576, Borromeo was already a model Catholic Reformation bishop. His piety and self-sacrifice during the epidemic were shown not only in religious duties, but in lavish alms-giving. In Mignard's painting a member of his retinue can be seen distributing alms.

Canonised in 1610, San Carlo Borromeo joined the ranks of the plague saints who were invoked in Milan in the plague of 1630.

Oil on copper, 64x48 cms. Iconographic collection, P 2125/1938.

Vero disegno... del grande lazaretto di S. Gregorio di Milano... nel tempo della gran peste l'anno 1630. Engraving by Gian Francesco Brunetti, c 1630 (photograph, reproduced from Archivio Storico Lombardo, vol. 50, 1923).

The construction of the lazaretto of Milan, just outside the city, began in 1488 and took twenty years to complete. It took the form of a series of rooms built around a square courtyard. In its vast scale (378x370 metres), the lazaretto dwarfed the cathedral and other buildings of Milan. It was to house more than 14,000 persons at a time during the plague of 1630.

During this epidemic, the lazaretto was divided into zones, including separate areas for the sick and for the 'suspect', those in close contact with the disease. Brunetti's engraving enables us to follow the plague victims from their arrival on the pest cart to their burial in quicklime in the trenches of S. Gregorio.

In the foreground, on the edge of town, Cardinal Federico Borromeo, a relative of San Carlo, and his successor as Archbishop, can be seen giving communion to the infected (number 49).

La sentenza data a quelli che hanno avelenato molte persone in Milano l'anno 1630. Engraving.

The terror engendered by the plague could produce violent social reactions. In the sixteenth and seventeenth centuries fears were rife that 'anointers' were spreading the disease, in ways such as daubing the plague poison on

door handles. Accusations against plague spreaders were made in Geneva in 1530. In London, too, Nathaniel Hodges wrote of wicked nurses in the plague of 1665 who secretly conveyed the pestilential taint from the sores of the infected to those who were well.

Fears of anointers, already expressed in Milan in 1576, were revived in the epidemic of 1630. A health official, Guglielmo Piazza, and a barber, Giangiacomo Mora, were accused of smearing plague poison around the town. Under repeated torture they confessed to the crime. The horrific sentence carried out on them is the subject of the engraving. When they were dead, their bodies were burned and the ashes thrown into the river. The house where the plot was said to have been hatched was torn down, and replaced by a column of infamy.

The engraving here is a later copy of the original, which was executed in Rome by Horatio Colombo, probably soon after the events which it portrays.

Olivero Panizzone Sacco, Pianto della città di Milano per la pestilenza dell'anno 1576 e 1577. Alessandria, [1577].

This is an eye-witness account of the plague in Milan in 1576 and 1577. Amongst other things, the author describes the processions in which Carlo Borromeo walked barefoot, bearing a heavy cross. Around his neck was a noose, a symbol that his life was offered as a scapegoat for his people.

Olivero Panizzone Sacco, Giubilo della città di Milano per la gratia ricevuta ... della liberatione della contagiosa infermità pestilentielle. Alessandria, [1578].

In this companion piece to his Pianto..di Milano, the author rejoices in the liberation of the city from plague. Both copies of Panizzone Sacco's books exhibited here bear the signature of padre Paolo Crispi, to whom they were given by the author.

#### CASE 7. LONDON'S DREADFUL VISITATION

Plague was an almost constant presence throughout England in the sixteenth and seventeenth centuries. There were a number of serious outbreaks culminating in the last and most famous, the 'Great Plague' of 1665, which, together with the fire which followed it, devastated London.

Though earlier epidemics of plague left a literary legacy in the works of George Wither and Thomas Dekker, the Great Plague has had an unrivalled hold on the imaginations of later generations. This is partly the result of contemporary accounts by physicians such as Nathaniel Hodges and George Thomson, and by Samuel Pepys, who remained in the city throughout. Daniel Defoe's fictional Journal of the plague year fixed an image of this epidemic in the minds of the reading public.

The Bills of Mortality chart vividly the progress of the epidemics in London. Their accuracy was, however, limited. Plague deaths were not always reported as such, because of difficulties of diagnosis or through the relatives' anxiety to avoid being confined to their homes.

Scenes of plague in London. Photograph from W.G. Bell, The Great Plague in London in 1665. London, 1924.

These scenes from a pictorial broadside of 1665-66 present a contemporary view of London in the grip of plague.

1. A sick room with a searcher, carrying the regulation red wand or stick, about to view a corpse lying beside a coffin.



2. A street scene showing a dog-killer at work, searchers, a raker with wheelbarrow, and fires which were lit in the streets to cleanse the air.
3. Flight from London by boat.
4. Runaways presenting a bill of health to country guards.
5. Corpse-bearers carrying their red sticks.
6. Dead carts.
7. Plague pits.
8. A funeral procession. These were strictly forbidden but they did occur, and Pepys records seeing one.
9. Runaways returning to London.

'This day, much against my will, I did in Drury-lane see two or three houses marked with a red cross upon the doors, and 'Lord have mercy upon us' writ there - which was a sad sight to me, being the first of that kind that to my remembrance I ever saw. It put me into an ill conception of myself and my smell, so that I was forced to buy some roll-tobacco to smell and chaw - which took away the apprehension.' (Samuel Pepys, Diary, London, 1722.) Tobacco was much in vogue as a prophylactic in plague time. A former scholar at Eton recalled being whipped for not smoking. The author of Golgotha, who signed himself J.V., thought tobacco was the best possible preservative against plague, because 'experience shows that tobacco, where it is smoked much, will furnish a room for continuance, and they that take it will stink of it long.'

The dead cart. Nineteenth century watercolour, artist unknown. 18.5x14cm. Probably an amateur copy of the engraving by Davenport from the drawing by George Cruikshank which was published as the frontispiece to Defoe's A journal of the plague year, London, 1835.

'The cart had in it sixteen or seventeen bodies; some were wrapped up in linen sheets, some in rugs; some little other than naked, or so loose that what covering they had fell from them, in the shooting out of the cart, and they fell quite naked among the rest; but the matter was not much to them, or the indecency much to anyone else, seeing they were all dead, and were to be huddled together into the Common Grave of Mankind, as we may call it, for here was no difference made, but poor and rich went together. There was no other way of burials, neither was it possible there should, for coffins were not to be had for the prodigious numbers that fell in such a calamity as this. Text from Daniel Defoe, A journal of the plague year, London, 1722.

Plague pit. An unidentified photograph, said to be of a London plague pit. Plague pits are often recognised as such by the remains of the clay pipes smoked by the bearers and then thrown into the pit.

Seventeenth century lead mortuary crosses recovered from the site of Greyfriars and said to be from the graves of plague victims. W.M.H.M., inventory numbers A.635017-8.

Autograph letter dated 3 October 1665, from a London runaway with the appropriate name of William Lightfoot. Sending to London for money, Lightfoot writes that he must defer coming there himself 'untill it shall please God to make London a more healthfull place'. Western MS. collection.

Thomas Cocke, Advice for the poor by way of cure and caution. [London, 1665].

The poor suffered most in any epidemic of plague and advice books aimed at the poor were common. Cocke's pamphlet was sanctioned by the principal officials concerned with controlling the London plague, the Duke of Albemarle and the Earl of Craven. A recommendation signed by the latter desiring that every parish clerk should obtain a sufficient quantity to distribute among the poor, is printed at the end of Cocke's text.

Londons Lord have mercy upon us. A true relation of seven modern plagues or visitations in London, with the number of those that were buried. London, 1665.

A broadsheet with statistics of burials and of plague mortality for 1592, 1603, 1625, 1630, 1637-8 and 1665. The printed statistics to September 5th 1665 have been continued in manuscript to May 29th 1666. Burials at St. Martins in the Fields from May 1665 to July 1666 have also been added in manuscript. The woodcut shows an angel with sword and flail, representing plague as the scourge of God, and Death with an arrow and hourglass. The runaways fleeing from London are met either by death with coffins and shrouds or by the weapons of countrymen guarding their villages and towns. Guildhall Library, London, Broadside 26.12.

Orders conceived and published by the Lord Major and Aldermen of the City of London concerning the infection of the plague. London, [1665.]

The regulations include directions for the burial of the dead between sunset and sunrise, though at the height of the plague this system broke down, as Pepys noted: 'The people die so, that now it seems they are fain to carry the dead to be buried by daylight, the nights not sufficing to do it in.'

The shutting up of infected houses as it is practised in England soberly debated. [London, 1665.]

This anonymous tract argues that the practice of shutting up sick and sound together increases the spread of the plague. The author paints a gloomy picture of the plight of the sick cut off from medical attendance, deprived of antidotes and medicines, and left to the ministrations of the nurses, the 'off-scurings of the City' motivated solely by avarice, those 'dirty, ugly and unwholesome Hags.'

George Thomson, Λοιπτομια: or the pest anatomized. London, 1666.

George Thomson (1619-77) was a follower of van Helmont. He tried to organise a College of Chemical Physicians in 1665, issuing an advice book on plague to rival that of the College of Physicians. Thomson performed an autopsy on the body of a fifteen year old servant, assisted by another servant and protected by burning sulphur, as the frontispiece (which illustrates the cover of the catalogue) shows. Thomson was anxious to quash rumours that several of his friends, including George Starkey, died as a result of participating in this post-mortem. Thomson fell ill soon after performing the dissection and consulted Starkey, who was already ill and dying of plague. Thomson believed that he cured himself by wearing a linen bag containing a large dried toad which swelled; 'the adjunction of this Bufo nigh my Stomack, was of wonderful force to master and tame this Venom then domineering in me.'

Nathaniel Hodges, Loimologia: or, an historical account of the plague in London in 1665. London, 1720.

Nathaniel Hodges (1629-88), Fellow of the College of Physicians, published what is probably the best account of the 1665 plague. The Latin edition was published in 1672 and this is the first English translation, with additions by

John Quincy. Hodges remained in London, treating patients throughout the epidemic, while many of his colleagues left the city. Hodges gives an account of his daily routine which shows his constant recourse to glasses of sack, his 'old favorite Liquor', to defend him from infection. It is said that this habit proved his ultimate downfall - he died in Ludgate Debtors' Prison.

London's dreadful visitation: or, a collection of all the Bills of Mortality for this present year. London, 1665.

Title page with typical funerary border of skulls and bones, spades and shrouds.

Page from London's dreadful visitation. London, 1665.

This page gives the number of deaths for the week of the 12th to the 19th September, when the epidemic was at its peak. The bill records 7165 deaths from plague in this week, but the real total may have been as much as twice this number.

#### CASE 8. PLAGUE AND THE PONTIFF: ROME 1656-7

Genoa, Rome and Naples, which had escaped the previous outbreak of plague in Italy in 1630, all fell victim in the year 1656. In Genoa 65,000 deaths were recorded, while in Naples, the most densely populated city in Italy, mortality may have exceeded 200,000.

Rome was less seriously affected, with some 14,500 deaths. Presiding over plague control in the city was Cardinal Gastaldi, whose Tractatus de avertenda et profliganda peste, (Bologna, 1684), is probably the most massive study of plague ever published. Gastaldi attributed the comparatively small mortality in Rome to the excellence of the plague officials appointed by Pope Alexander VII, and to the vigour with which the plague orders were enforced.

Health pass issued to Giovanni Francesco Buonamici by the health authorities in Rome, 7 September 1633. Western MS. 5139/7.

Mattia Naldi, Regole per la cura del contagio. Rome, 1656.

This book by Mattia Naldi, who was physician to Pope Alexander VII, was compiled soon after the outbreak of plague in Rome. It aimed to provide urgently needed advice on the causes, diagnosis and treatment of the disease.

Ordini, diligenze e ripari fatti con universal beneficio dalla paterna pietà di nostro signore P.P. Alessandro VII et eminentissimi signori Cardinali della Sacra Congregazione della Sanità per liberare la città di Roma dal contagio. Rome, 1657.

Two of a series of three engravings, illustrating plague control measures in Rome, published by Giovanni Giacomo de Rossi in February 1657. They were dedicated to Mario Chigi, brother of the Pope.

Giuseppe Balestra, Gli accidenti più gravi del mal contagioso osservati nel lazzeretto all'isola. Rome, 1657.

Balestra was chief surgeon on the island in the Tiber used as a lazaretto for the plague sick. From his experience he recorded a variety of incidents and clinical details. An unusual feature of his book is his observation that blood-letting proved to be a dangerous remedy. He claimed that of every hundred patients treated in this way, barely six survived.



A plague doctor in protective costume, 1656.

This work by J. Columbina, engraved by Paulus Furst, shows Dr. Schnabel in the costume which he wore in Rome during the plague. In the foreground may be seen a group of citizens put to flight by the doctor's frightening appearance. Photograph, reproduced from H.H. Mollaret and J. Brossollet, La peste, source méconnue d'inspiration artistique, Antwerp, 1965.

Bronze plaque celebrating the achievements of the pontificate of Alexander VII  
Heading the list of achievements is the freeing of Rome from the plague of 1656-7. W.M.H.M., inventory number A.629407.

#### CASE 9. GOD'S SHARP SCOURGE

Doctors and health officials sought to understand plague in naturalistic terms, and to oppose it with down-to-earth methods. At the same time plague was acknowledged to have a theological dimension, as a divine punishment for sin. A religious methodology for preventing and remedying the disease grew up, paralleling the medical one. Repentance, fasting, prayer, processions, the cult of saints, and votive art and architecture, all came to be seen as weapons to defeat the disease.

Moralists satirised the ineffectual remedies of the doctors. 'Only this Antidote apply', wrote Thomas Dekker in 1604, 'Cease vexing heaven, and cease to die.' Sometimes, too, the Church resisted attempts by health officials to restrict processions and religious assemblies. For the most part, however, Catholic and Protestant communities alike sought to apply both religious and medical remedies to the catastrophe of plague.

Philippus Culmacher, Regimen...wider die grausamen erschrecklichenn  
totlichen Pestelentz. Leipzig, c 1495.

The woodcut on the title page of this book provides a summary of the religious iconography of plague. Plague is seen as a visitation from God brought by an avenging angel. Grouped around the central figure of the grim reaper are, in the heavenly plane, the mater dolorosa and saints Sebastian and Roch. Below, a bishop and a layman pray over figures in shrouds and on the left a priest administers the sacraments to a plague victim.

The Virgin Mary protecting the faithful. Copy of a German woodcut, c.1490-1500, from P. Heitz and W.L. Schreiber, Pestblätter des XV Jahrhunderts. Strasbourg, 1901.

The arrows of God's wrath were a frequent theme of religious art in time of plague. Often the Virgin Mary was shown protecting the faithful by sheltering them under her mantle.

Christ in judgement, with Saints Sebastian and Roch. Copy of a German woodcut c.1470, from Heitz and Schreiber, op.cit.

The invocation of plague saints was extremely popular in Catholic communities. St. Sebastian's martyrdom by archery in the third century seems to have associated him with the plague-bearing arrows of God's wrath. The cult of St. Roch grew up later. It became popular in the last quarter of the fifteenth century, after a successful piece of burglary and grave-robbing brought his body to a new shrine in Venice. St. Roch is usually shown in pilgrim dress, displaying a bubonic swelling on his upper thigh. He is often accompanied by his dog, or by an angel.

St. Sebastian. Copy of a German woodcut, early sixteenth century. From Heitz and Schreiber, op.cit.

Pietro Testa (1617-50) of Lucca, Three saints interceding with the Virgin and child for the plague victims. Etching. 27 x 19 cm.

W.W., The Christians refuge: or, heavenly antidotes against the plague. London, 1665.

The text of this work consists of meditations on the theme of contemptus mundi. The author believed that plague was the result of sin, but notes secondary causes such as 'sluttish, nasty, durty houses', 'the plague sweeping them away in a short time who would find no time to sweep their houses'. The book ends with medical receipts but the author warns, 'trust not so much in the Physick as in the blessing of God'.

Consilium reverendi patris domini Theophili de Mediolano ordinis Sancti Benedicti contra pestem. Italian MS., fifteenth cent.

Whether it was right to oppose the flail of God's wrath by flight, medicine, or plague control, was debated by both Catholic and Protestant writers. In this satirical comment on medicine in time of plague, which had numerous parallels in seventeenth century England, all remedies are said to be vain except an emetic made of confession, an electuary of the body of Christ, and an ointment of holy oil.

Western MS. 668, ff.97v.-98r.

The sign of the Thau. Copy of a German woodcut c.1500, from Heitz and Schreiber, op.cit.

The sign of the Thau was thought to have been given by God to Moses to preserve the people from plague. It is widely found in fifteenth and sixteenth century manuscripts and broadsides concerned with plague. Anyone who looked on the sign was thought to be safe that day from plague, as was anyone who had it depicted in his house.

Talisman against the pestilence

This sign or talisman, showing a cross surrounded by circles, appears in a collection of medical recipes written in England in the fifteenth century. It purports to be a sign given by an angel to an Abbot of Corby(?) in Lincolnshire. In the inner circle are the words 'Alma crux Christi salva me a presenti Angustia pestilencie qui salvatrix nostra es.' Signs such as this were probably carried as amulets in time of plague.

Western MS. 404, f.32v.

Cause et rimedii della peste ... raccolti per ordine di Mons. Rev. Marco Gonzaga, Vescovo di Mantova. Florence, 1577.

During the Counter Reformation the religious measures to be taken against plague were given systematic form, especially in the church orders adopted in Carlo Borromeo's Archdiocese of Milan in 1579. Causes of plague listed by the Bishop of Mantua included heresy, theft (especially of religious objects), usury, madrigals, lascivious dancing, pornography, and nudism, even when posing as art. Amongst remedies were prayer, fasting, confession and communion, the burning of cards and other vanities, and processions.

Long-handled forceps, for use in giving communion (copy).

Forceps of this kind were used in time of plague in the seventeenth century, to prevent contact between Catholic priests and communicants.

W.M.H.M., inventory number A.629403.

A fourme to be used in Common Prayer twyse aweke...during this tyme of mortalitie. London, 1563.

Prayers and homilies drawn up by Archbishop Matthew Parker on the order of Queen Elizabeth I for use in the liturgy during plague.

By the King. A proclamation for a generall Thankesgiving to Almighty God for...asswaging the late fearful visitation of the plague. London, 1625.

A broadside proclamation showing the religious view of plague as a manifestation of divine anger to be turned away by repentance, fasting and prayer.

#### CASE 10. ST. SEBASTIAN AND ST. ROCH

St Sebastian. Wooden statue. German, possibly sixteenth cent.  
W.M.H.M. inventory number A.634377.

St Roch. Wooden statue. German, possibly fifteenth cent.  
W.M.H.M. inventory number A.75594.

#### CASE 11. THE NUREMBERG CHRONICLE

Hartmann Schedel, Liber chronicarum. Nuremberg, 1493.

The most famous illustrated incunable, the Nuremberg Chronicle, is a world history compiled by Hartmann Schedel (1440-1514), a Nuremberg doctor. This copy, formerly in the library of William Morris, has extensive manuscript annotations written in the last years of the fifteenth and the first years of the sixteenth centuries. The author of the marginalia records numerous epidemics of plague as well as the effects of a new disease, syphilis. The note on the upper right-hand side of the woodcut of Nuremberg can be translated 'Note that in the year of our Lord 1494, it was said by various merchants and other individuals that as many as 8600 people died of plague in the city.'

The burning of the Jews, photograph of a woodcut from Schedel, Liber chronicarum.

The holocaust of 1348-50 began in Southern France, but was particularly fierce in Switzerland and Germany. Jews were accused of poisoning wells and thereby spreading plague. The confessions extracted under torture from a handful of Jews in 1348 sparked off massacres of entire Jewish communities, the Jews in many cases being burned alive.

The dance of death, photograph of a woodcut from Schedel, Liber chronicarum. The Chronicle divides history into six ages. The seventh age, eternity, is introduced by a description of the Last Judgement featuring this lively version of the dance of death. The genre of the dance of death was an important early artistic response to plague.

Ains Erbern Raths der Stadt Nürnberg vernewete Gesetz und Ordnung in gegenwertigen Sterbsleufften. Nuremberg, 1562.

Orders made by the City Council during plague (literally 'deadly air'). These provide sanitary and quarantine measures and directions for sick persons to be taken to the newly-built lazaretto.



Despite the quarantine system designed to protect European ports from infected ships from the Middle East, plague reached Marseilles in 1720. The city's doctors were slow to recognise the disease and it spread rapidly through the poor quarters. The city's officials were soon overwhelmed by the scale of the epidemic. Hospitals were filled as soon as opened. Beggars and galley-slaves were pressed into service as corpse-bearers, but the enormous number of the dead swamped their efforts. Thousands of bodies lay in the streets at the height of the epidemic. The pestilence in Marseilles horrified the rest of Europe. In England the printing presses were busy with the subject, while the authorities introduced more stringent precautions.

The Sicilian port of Messina suffered a similar catastrophe in 1743. 50,000 people died in this plague which was again brought by ship. As at Marseilles, the first cases were wrongly diagnosed.

In the early eighteenth century plague was rife in the Baltic countries and in the Ukraine, but there was a lull before Russia suffered the major epidemic of 1771. The Moscow plague was notable for the riots which occurred as mobs turned against the doctors and broke open places of quarantine.

Vue du port de Marceille prise de l'Hôtel de Ville

Coloured engraving, anon. after Jacques Rigaud (Marseilles 1681-1745 Paris). 35x49cm. Vue du Cours de Marseilles

Coloured engraving, anon. after Jacques Rigaud. 33x49cm.

Two engravings on the plague at Marseilles were commissioned by the city in 1720 and were executed by a local engraver, Jacques Rigaud, after his own drawings. These crudely coloured (partly oxidised) impressions are later eighteenth century states made for a popular market.

Richard Bradley, Plague at Marseilles consider'd: with remarks upon the plague in general, shewing its cause and nature of infection. London, 1721.

Richard Bradley (d.1732) became Professor of Botany at Cambridge and lectured on materia medica. He published several short works on plague during 1721-22. Bradley accepted the popular theory that tobacco was 'noxious to these venomous insects which I believe to be the Cause of Plague'. He was also hopeful that coffee-drinking would prove to be prophylactic. This work opens with a physician's eye-witness account of the Marseilles plague.

Modelle d'habit contre la peste. Portrait de M. Chiconneau à Marseille. Montpellier, 1721.

This broadsheet purports to show Francois Chicoyneau (1672-1752) Professor of Medicine at Montpellier, who was sent with M. Verny to Marseilles to make an official investigation into the nature of the epidemic. Their report confirmed that the disease was plague, but advised that this be kept secret to avoid a panic. Despite the reassurances of the city officials, all who could do so fled out of Marseilles. Chicoyneau, Verny and another professor from Montpellier returned to the city to care for the sick.

Orders for watchmen on the coast of Lincolnshire.

In the wake of the epidemic of plague in France, the Privy Council ordered watches to be kept on the English coast. In response, these orders were issued by Joseph Banks at Revesby to the constables on the coast of

Lincolnshire. Watchmen were to keep watch by day and night for ships from infected areas. Such vessels were not to land any man or goods, or receive any person from on shore. 23 October 1721.  
Uncatalogued Western MS., from the papers of Sir Joseph Banks and his family.

Dettaglio intero, e compito di quanto e accaduto intorno al mal contagioso nella città di Messina. Foligno, 1744.

Messina had been free of plague since 1624, thanks to the city's strict quarantine laws. In 1743, however, a vessel from Corfu brought the disease. This book contains lists of the principal citizens who died in the epidemic and those who survived. It ends with prayers to St. Roch.

Ristretto della copiosa relazione che rimette a Sua Eccellenza illustrissimo D. Domenico Pesabene per li successi di Messina e suoi casali.

This account of the plague in Messina, dated 8 August 1743, records detailed statistics of mortality. Deaths from plague in the city and its suburbs, and in outlying villages, numbered 46,825. Estimates of deaths in the army, and amongst other groups not recorded in the normal way, brought the overall total to some 50,000. Uncatalogued Western MS.

Charles de Mertens, Traité de la peste, contenant l'histoire de celle qui a régné à Moscou en 1771. Vienna etc., 1784.

Riots occurred during the Moscow plague of 1771. They stemmed from popular resentment at the ban on assemblies and traditional burial rites, which included embracing the dead. The riots ended with the murder of Archbishop Amvrosii. De Mertens deplored the rioting, which, he believed, spread the contagion to a point where there were more than 1200 deaths a day. During the plague, de Mertens was physician in charge of the Moscow orphanage. It escaped infection, perhaps as a result of his stringent precautions.

### CASE 13. THE NAPOLEONIC ERA

The risks to Western Europe from the continuance of plague in the Balkans and Eastern Mediterranean became apparent when plague broke out in Napoleon's army in Syria in 1799. A thousand deaths from plague, almost as many as occurred in combat with the Turks, compelled Napoleon's retreat to Egypt.

British observers who had welcomed this outbreak as God's judgement on the French were discountenanced in 1813, when nearly 4,500 deaths from plague occurred on Malta. There were further outbreaks in 1815 on Corfu and Cefalonia, which were also in British control.

The vigorous measures taken by the British authorities on Malta were based on the system adopted during the previous plague on the island, in 1675. On Corfu and Cefalonia some villages were burned or evacuated, while in others every house was closed up. By this means plague was said to have been "hermetically sealed."

Bonaparte touchant les pestiférés. Coloured woodcut by Thiébault. Published at Epinal, 19th cent. 57x42cm.

Napoleon's need to restore the morale of his army, and continuing uncertainty over the doctrine of contagion, led to his gesture of touching the plague sick in the hospital at Jaffa in 1799. Representations of this event, based mainly on the painting by Baron Gros in the Louvre, seem to associate Napoleon with the kings of France and their ritual touching for the king's evil.

Poisoning the sick at Jaffa. Aquatint and etching, published by Thomas Tegg, London, 29 Nov. 1814. 19x11 cm.  
This English caricature may be taken as a satirical assessment of the benefits of Napoleon's touch. But it also alludes to the grim reality of the Emperor's retreat from Syria. Certain of the plague sick who could not be evacuated were given fatal doses of laudanum to prevent their falling into the hands of the Turks. Cf. British Museum, Dept. of Prints and Drawings, Catalogue of political and personal satires, item 12466.

Sir William Burnett, Report on plague in Malta in 1813.  
Burnett was physician to the Mediterranean fleet at the time of the plague. His report, written in 1814 after his return to England, was probably sent to Lord Melville. Burnett records that 'the number of deaths occasioned by the plague in Malta stands thus: April 1 - May 108, June 804, July 1596, August 1023, September 675, October 141, making a total of 4348.'  
Western MS. 1421.

Major-General Sir Charles Phillips, Letter book during plague in Corfu, 1816.  
Phillips was given the supreme direction of plague control on Corfu in March 1816. One of his main policies was to evacuate infected villages, moving the inhabitants of each to a separate camp.  
Western MS. 3883.

Andrew White, A treatise of the plague... illustrated by the plan of operations successfully carried into effect in the late plague of Corfu. London, 1846.

White, an army staff surgeon, served under Major-General Phillips in supervising Lefchimo, the plague infected area of Corfu. A convinced contagionist, his book was written to uphold the importance of plague control, without which, he believed, plague would return to Great Britain.

#### CASE 14. CONTAGION AND ANTI-CONTAGION

The Black Death, which was seen to have been carried to Western Europe by galleys from the Black Sea, encouraged the belief that plague was contagious. Civic authorities built on this understanding of the disease through the work of the Health Boards. Doctors were slower to respond, for medical tradition attributed the cause of epidemics not to contagion, but to an environmental corruption of the air.

By the sixteenth and seventeenth centuries, however, doctors had come to accept that although plague took its origin from a corruption of the air, it could also spread from an original outbreak to other places by contagion alone. This left room for debate, in any particular instance, as to which of the two factors was responsible, or even whether both were operative simultaneously. Stephen Bradwell wrote in 1636, 'The contagion indeed this yeare was begotten beyond Sea, and was rock'd hither in sicke bodyes; but our Ayre I feare will prove a Nurse though not a Mother to it.'

Later, the two doctrines drew apart once more. In the eighteenth century, despite widespread controversy, the contagionists more or less held sway, thanks to the persuasive arguments of Richard Mead. The debate, however, remained heated, and was the subject of a select committee of the House of Commons in 1819, in the wake of the plague in Malta and Corfu. The committee found in favour of contagion, but the impressive experience of



Clot-Bey in Egypt was soon to be added to the arguments of the anti-contagionists. As late as 1894, during the plague in Hong Kong, doctors on the spot such as Sir James Cantlie were seeking to explain the disease not in terms of contagion, but as a soil-bred poisoning of the environment.

Girolamo Fracastoro, De contagione et contagiosis morbis. Venice, 1546.

Fracastoro's sustained use of a vocabulary of living seeds in discussing contagion has led to claims that he was a forerunner of germ theory. More recent studies, however, have stressed the unity of his thought with classical theory. His book can be seen as expressing old ideas in a new way, in an attempt to reconcile the notions of contagion and corrupt air.

Ludovico Pasini, De pestilentia Patavina anno 1555. Padua, 1556.

The minor outbreak in Padua focused the attention of Europe's leading medical school on the plague. The general conclusion was that contagion alone was the cause, and that in this instance the air remained pure. Bassiano Landi thus found that bread, milk and egg yolk exposed in the air overnight did not go bad. Pasini wrote, 'I take it therefore as definite that this dire disease arose from contagion. Let anyone who denies it deny, too, that snow is white and fire hot, and let him be taken to the lazaretto for his pains, to find out at his own risk whether plague comes from contagion or from the influence of the heavens or the air.'

Richard Mead, A short discourse concerning pestilential contagion. Fourth edition. London, 1720.

The most influential response to the renewed threat of plague from France was this work by Mead, whose advice on quarantine and preventive measures became official policy. Mead described contagion as propagated by three causes, 'the Air; Diseased Persons; and Goods transported from infected places.' The copy shown, of the fourth edition, which came out in the year of the book's first publication, has a presentation inscription from Mead to Hermann Boerhaave.

House of Commons, Report from the select committee on the doctrine of contagion in the plague. London, 1819.

Amongst the witnesses were Sir Arthur Brooke Faulkner, a contagionist who had been physician to the forces during the Malta plague, and Charles McLean, M.D., author of Evils of quarantine laws, and non-existence of pestilential contagion. McLean had fallen sick with plague in Constantinople. Asked how he caught the disease, he replied 'By the air'. The committee nevertheless accepted the majority view in favour of contagion.

A.B. Clot-Bey, De la peste observée en Egypte. Paris, 1840.

'Je suis anti-contagioniste', wrote Clot-Bey in the foreword to his book. His deeply held conviction was based on personal experience during the plague in Egypt in 1835. 'We were', he wrote, 'in the most intimate contact with the sick at all stages of their illness. We received on our clothes and hands the matter of their vomit, the blood from venesection, the pus of thousands of buboes that we opened, the fluid of carbuncles'. How could they have survived if plague were contagious? Experiments at transmitting the plague to condemned criminals had failed, and Clot-Bey had even had himself inoculated with plague matter without effect.

## CASE 15. PLAGUE AFTER PASTEUR

The new science of bacteriology pioneered by Pasteur and Koch opened up fresh avenues for research into plague. When the disease broke out in Hong Kong in 1894 it immediately became the focus of an inquiry which led to the discovery of the plague bacillus by Alexandre Yersin.

The discovery was timely, for plague spread from Hong Kong to all parts of the world. Bombay was infected in 1896, and by 1903 deaths from plague in India were exceeding one million each year. In the Punjab alone nearly three million deaths from plague occurred in the first twenty years of the pandemic.

Observers in the Far East in the nineteenth century were struck by a phenomenon never recorded during the centuries of plague in Europe. Rats were seen to die in large numbers prior to the outbreak of plague. Research into this phenomenon in Bombay, by P.L. Simond and others, led to the conclusion that plague was primarily a rat disease, which spread in a secondary way to the human population. But how was the disease spread from rat to man? Simond's solution, published in 1898, recognized the intermediary to be the rat flea. The events leading to an outbreak of plague were now clear. First there was a rat epizootic. As the rats died, their fleas turned for nourishment to the human population. The bites of infected fleas began the plague epidemic.

Alexandre Yersin, 'La peste bubonique à Hong Kong', Annales de l'Institut Pasteur, 8, 1894, 662-667.

Yersin's paper announcing his discovery, which includes a photograph of the plague bacillus, now known as Yersinia pestis.

Lent by the Library of the Royal Society of Medicine.

Alexandre Yersin (1863-1943). Portrait photograph.

A plague victim arriving at the Wari Bunder Hospital, Bombay, c.1896-97. Original photograph (albumen print). One of a series of photographs of plague in Bombay in the iconographic collection.

Cremation scenes during the plague in Bombay 1896-97.

Original photographs (albumen prints).

P.L. Simond, 'La propagation de la peste', Annales de l'Institut Pasteur, 12, 1898, 625-687.

Simond's classic paper on the role of rats and rat fleas in the epidemiology of plague. Lent by the Library of the Royal Society of Medicine.

P.L. Simond (1854-1947). Portrait photograph.

The Plague Research Commission: examining rats and catching fleas in Bombay. Photographs published in the Commission's 'Reports on plague investigations in India', Journal of Hygiene 6-10, 1906-10.

The Plague Research Commission was set up by the Secretary of State for India in 1904, at the instance of the Lister Institute of Preventive Medicine. Amongst its senior members was W. Glen Liston. The studies published by the Commission between 1906 and 1910 demonstrated in massive detail the role of rats and their fleas in the genesis of plague epidemics.



The plague prophylactic. Extract from W.M.W. Haffkine, 'A discourse on preventive inoculation', The Lancet, 24 June 1899.

Waldemar Haffkine began work on a vaccine against plague in Bombay in 1896. By the following January he was sufficiently confident to have himself inoculated. Haffkine was able to build upon the success of his vaccine through the Plague Research Laboratory which he founded in Bombay, where scientists from many countries were taught vaccine preparation and inoculation procedures.

W.M.W. Haffkine (1860-1930). Portrait photograph.

Major H. Pridmore, I.M.S., inoculating against plague in the bazaar at Mandalay. Original photograph.

Plague protective costume used in Queensland, Australia, 1900-07. Photograph, reproduced from L.F. Hirst, The conquest of plague. Oxford, 1953.

Photographs of plague patients, Rio de Janeiro, probably during the outbreak of plague in 1900. Cf. case 2.

#### CASE 16. IMAGES OF PLAGUE

Bella, rerum caritas, pestilentiae. Engraving by Sadler after Maarten de Vos. Late sixteenth cent. 27x20cm. This engraving repeats the familiar association of plague with famine and war. These were linked in the apocalyptic tradition, but also in a more direct way in that famine and war created conditions favourable to plague.

Burying the dead. Coloured print, after Felix Jenewein (1857-1905). 53 x 40 cm. This was one of six scenes of plague which Jenewein executed in 1900.

Shooting the plague bacillus. Cartoon by Chaval, 1954, showing a scientist with a microscope and a gun, attempting to shoot the plague bacillus. Photograph from H. Mollaret and J. Brossollet, La peste, source méconnue d'inspiration artistique. Antwerp, 1965.

The pest cart. Cartoon by Graham Wilson, showing a pest cart employed in time of plague during the Vietnam war. One corpse-bearer says to another, 'Of course, once the plague's done, we're both out of a job'. Wilson's cartoon recalls the words attributed to a sexton in time of plague by T.F., in Newes from the north (1579): 'Wife (quoth he) if there come two corpses today, we will have a shoulder of mutton and a quart of sack to supper. And if there come but one, we will have a shoulder of mutton and but a pinte of sack.'

#### CASES 17-18. PLAGUE AND MEDICAL SCIENCE

Definition. Plague is a disease of wild and peri-domestic rodents caused by a bacillus, Yersinia pestis. In nature the organism is transmitted among rodents and from rodents to man by the bite of infected fleas.



Pneumonic Plague occurs from inhalation of plague bacilli from infected wild rodent fleas dispersed during skinning, or from other cases of pneumonic plague.

Human infections may occur from contamination of skin abrasions or mucous membranes by infective material.

Vectors. Over 30 species of flea are proven vectors of plague, but in most countries the rat flea X.cheopis is the most important. In East Africa and Brazil X.brasiliensis may be the vector. X.astia, although common in the tropics, is a less efficient vector than either of the others.

The efficiency of the flea as a vector depends upon its susceptibility to plague bacilli, its longevity, which is governed by temperature and humidity, its readiness to attack man, and the density of the flea population of the rodent hosts which harbour the causal organism.

Optimal conditions for X.cheopis are 20 to 25°C. with a high humidity. Dryness and warmth hasten the death of fleas, but the microclimate of rodent burrows is more important than the open climate. The flea index is the average number of fleas found on each rat. An X.cheopis index of 3 to 5 is necessary for an epizootic, whilst an X.astia index of 7 is required.

Infective fleas are able to survive for long periods in merchandise. Plague has been carried by fleas in bales of jute from Calcutta to Peru - a journey of 80 days.

Not all fleas feeding on an infected rat become infected, and not all those that become infected become blocked and infective. In the case of X.cheopis 55 per cent may be infective, but in other species only about 20 per cent.

The dog and cat fleas, Ctenocephalides sp., the flea Nosopsyllus fasciatus, found on the sewer rat, and the flea of man, Pulex irritans, play little part in transmission.

Reservoirs. At least 220 different rodents can harbour plague, and in many foci the main permanent reservoirs have been identified. In Mongolia and Manchuria the marmot and tarabagan are dangerous sources of Y.pestis, while in the Central Asian Republics various species of Citellus harbour infection. In India, gerbils are known to be reservoirs. In the United States, squirrels, gophers, cotton-tailed rabbits and mice have been found infected together with their ectoparasitic fleas. The more resistant the animal reservoir is, the more efficient it becomes as a reservoir. Some species recover but remain persistent carriers.

Wild rodents and their fleas maintain infection between epidemic periods, but in the New World wild rodents may be secondarily involved by plague which arises from domestic rats.

Y.pestis has been found in camels, and outbreaks derived from these animals have occurred in Iraq and around the Caspian Sea.

When an animal dies from plague, its fleas quickly leave the body and seek another host; this is an important factor in the spread of infection.

Both species of domestic rat, Rattus rattus and R.norvegicus are susceptible to plague, usually dying of septicaemia within five days. Survivors have a high immunity to experimental infection.

Incidence. In rural areas man derives plague from wild animal reservoirs while hunting and trapping. However, in urban areas plague is a disease of societies living in poor hygienic conditions where unsatisfactory housing increases contact between man and rat. The incidence of plague is higher in summer and autumn than in other seasons of the year. Man to man infection may have played an important part in spreading mediaeval epidemics in cooler climates.

Prevalence. After 1945 there was a rapid decline in the prevalence of human plague and no satisfactory explanation for this has been found. In parts of Asia *X.cheopis* has been replaced by the less efficient vector *X.astia*. In 1973, 790 cases with 47 deaths were notified, this being the lowest figure for many years. In 1974, however, the total rose to 2,756 cases with 160 deaths, largely due to an outbreak in South Vietnam. In 1983 there were 715 cases, with 40 deaths.

At present, plague shows a pattern of sudden recrudescences which are related to natural foci of enzootic plague. From these foci, under suitable conditions, infection of man comes about either directly or through the agency of rat fleas.

Geographical Distribution. Numerous small but important foci of plague exist. The well-known areas are those in Brazil, Ecuador, Peru, the south-west United States, Vietnam, Burma, Indonesia and Kampuchea. In Africa, feral plague occurs in Rhodesia, Malagasy and Namibia. In Asia foci exist in Siberia, Mongolia and the south-eastern part of the U.S.S.R., Nepal and Kola in South India.

## **PATHOLOGY**

Pathogenesis. When *Y.pestis* is inoculated into the body, the bacilli are conveyed by the lymphatic system to the regional lymph nodes, where they multiply forming large colonies. The nodes become swollen and haemorrhagic and the surrounding tissues become oedematous. Virulent infections produce septicaemia with blood-borne infection of many organs, particularly the spleen and lungs. Haemorrhages are caused by the lipopolysaccharide endotoxin of *Y.pestis*, which damages the vascular endothelium and may cause disseminated intravascular coagulation. The outcome of plague infection depends on virulence and the initial dose of the organism. Hence pneumonic plague is often fatal within two days, while many cases of bubonic plague pursue a more benign course and recover after a long illness.

Macroscopical. In fatal cases, haemorrhages appear throughout the body, and blood-stained fluid is found in the serous cavities. Small haemorrhages may be present in many organs, including the spleen, liver, brain and myocardium. Primary plague pneumonia begins as an acute bronchiolitis followed by bronchopneumonic consolidation. Necrotic areas develop in the lungs, and acute cavitation has been described. The air passages are filled with haemorrhagic exudate.

Microscopical. The lymph nodes and surrounding tissues are engorged with red blood cells and colonies of *Y.pestis*. In cases that have survived for a long period, neutrophils accumulate in the nodes with the formation of pus.

In pneumonia complicating bubonic plague, the alveoli are filled with haemorrhagic exudate and the lung tissue undergoes consolidation.



Lethal effects result from the release of endotoxins and include the formation of fibrin thrombi in small blood vessels and capillaries particularly in the capillaries of the renal glomeruli.

## CLINICAL

Incubation Period. The incubation period is usually from 3 to 8 days, after which a bubo develops. Three or four days later, plague bacilli reach the bloodstream and secondary involvement of the lung may follow within hours.

Primary pneumonic plague is more fulminating, with a very short incubation period and a fatal outcome.

Bubonic Plague. The prodromal symptoms include malaise, headache and aching at the site of the regional lymph nodes later to become involved. The illness proper begins with a rigor, severe frontal headache, muscle pains and profound weakness.

In about 5 per cent of cases a small vesicle with a reddened areola develops at the site of the infecting flea bite. The enlarged lymph nodes become extremely tender and fixed to the surrounding tissues. In two-thirds of patients, the buboes are either inguinal or femoral. In others, the lymph nodes of the axillary, and less commonly the cervical, groups are involved. The buboes are usually unilateral and are often formidably large. The overlying skin is inflamed. In most cases which proceed to recovery the buboes subside, but less commonly they suppurate and may break down to form ulcers.

Toxaemia is marked and there may be mental confusion, tremor and an unsteady gait, with marked prostration and apathy. Purpura is common in severe cases, and the patches may undergo central necrosis.

The development of secondary pneumonic plague is accompanied by profound deterioration in the patient's condition. Meningitic plague is a rare complication.

Pneumonic Plague. In primary pneumonic plague the onset is sudden with cough and dyspnoea. The sputum is at first scanty and mucoid, but soon becomes blood-stained and abundant, containing great numbers of plague bacilli. Patchy areas of lung consolidation and signs of pulmonary oedema soon develop. Septicaemia always follows, haemorrhages are frequent and death from anoxia and cardiac failure occurs within two days.

Asymptomatic Plague. Asymptomatic pharyngeal carriers of Y. pestis have been described in association with minor epidemics in South Vietnam. Mild cases of bubonic plague occur and may be ambulant with indurated buboes that persist for several months.

## DIAGNOSIS

Clinical. The occurrence of fever and adenitis during an outbreak of plague should arouse suspicion. The rapid development of toxaemia and mental confusion and the exceptional painfulness of the buboes are important pointers to the diagnosis. In pneumonic plague, the severe toxaemia, cough and haemoptysis contrast with the relative absence of physical signs.

Laboratory. *Y.pestis* has a very complicated antigenic structure involving at least eight different antigens and a specific polysaccharide. Certain of these antigens have antiphagocytic properties, and the main mechanism of immunity to plague is the production of antibodies against them, thus permitting phagocytic activity to proceed on the part of the host.

Complement-fixing and haemagglutination tests are sensitive and specific to plague, and depend upon a single antigen known as Fraction 1. It is the main constituent upon which the effectiveness of a plague vaccine depends.

In smears from buboes, sputum or skin lesions, *Y.pestis* can be recognised by its bipolar appearance and Gram-negative character. Blood culture in nutrient broth containing 1 per cent of sodium citrate is also recommended, but precise identification of the organism may depend on subsequent animal inoculation. Guinea-pigs and white rats are susceptible and, in the presence of plague, die within five days of subcutaneous inoculation.

The postmortem appearances in such animals, with generalised enlargement of lymph nodes and milary abscesses in the spleen and liver, are characteristic. Smears can be made from these organs and the bacilli identified.

Differential Diagnosis. Bubonic plague must be distinguished from other diseases associated with adenopathy and fever, such as streptococcal infections, lymphogranuloma venereum, filariasis, glandular fever and tularaemia. Pneumonic plague must be distinguished from fulminating lobar pneumonia.

## TREATMENT

Specific. Tetracycline is the antibiotic of choice in plague, and should be given in doses of up to 6 g. daily during the first 48 hours. The intravenous route is essential in severely ill patients.

Streptomycin is effective, but severe intoxication may follow the massive destruction of plague bacilli with release of endotoxins. The drug should be given intramuscularly in a dosage of 500 mg. every four hours for two days.

When antibiotics are not available, bubonic plague can be treated with sulphonamides. In severe cases, 12g. of sulphadiazine should be given daily for 4 to 7 days. The alkalinity of the urine should be maintained with sodium bicarbonate. Sulphonamides are of no avail in pneumonic plague.

Supportive Therapy. Some clinicians still use plague antiserum as an adjunct to antibiotic treatment, particularly in the early stages.

Strict bed rest and adequate food intake are essential. Buboes should not be incised unless they are about to rupture. Open suppuration should be avoided if possible.

## PROGNOSIS

Mortality of untreated plague is high, and in primary pneumonic plague recovery is exceptional. The mortality from untreated bubonic plague is more than 50 per cent but specific treatment can lower it to 15 per cent. Mortality is lowest in patients under 15 years of age.

The prognosis is proportionately worse according to the degree of bacteraemia. Leucocyte counts of less than 5,000 or more than 40,000 per cm. are of grave significance. Most deaths occur between the third and fifth day.

## PREVENTION

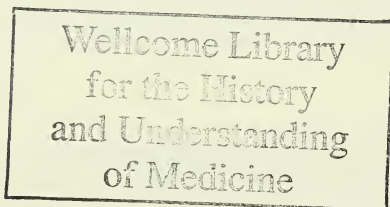
Immunisation. Two types of vaccine are available. One is derived from inactivated cultures of *Y.pestis* as originally prepared by Haffkine, and the other is made from live avirulent smooth *Y.pestis*, as formerly used in Malagasy. The dose of plague vaccine is 0.5 ml. subcutaneously, followed by 1 ml. from one to three weeks later. No suitable reference vaccine is available. Immunisation is ineffective against droplet infection, but appears to reduce the mortality of plague in untreated individuals at epidemic times.

Chemoprophylaxis. This form of protection is recommended for those exposed to plague, and among selected populations it can be used as a short-term measure until other steps can be taken. Tetracycline should be given in a dose of 250 mg. every six hours for a week.

Personal Protection. Personnel at particular risk should be protected with masks, goggles, rubber gloves, cotton gowns, and suitable footwear.

Quarantine. The eradication of rats from ships requires special fumigation procedures. Urban outbreaks require measures directed towards rat destruction, employing traps and the cautious laying down of poisons. All rodenticides must be handled with great care as they can affect man. Of many different kinds, Warfarin (an anticoagulant dihydroxycoumarin derivative), takes first place in safety and effectiveness.

Wild Reservoirs. The control of wild rodent reservoirs of plague is a major undertaking in which destruction by gassing or poison bait is necessary. However, control can be achieved by dusting rodent burrows with 5 per cent DDT dusting powder to kill fleas. Constant surveillance may be necessary in some areas, and a haemagglutination test is used to detect infections in rodent populations. Effective control should be reflected by the disappearance of antibodies from the sera of the rodent population. These methods of control have been chiefly exploited in the U.S.S.R., California and South Africa.



## PHOTOGRAPHS ON SCREENS

St. Sebastian. Woodcut from a German broadsheet of c 1475. Reproduced from P. Heitz and W.L. Schreiber, Pestblätter des XV Jahrhunderts. Strasbourg, 1901.

Surgeon lancing a bubo. Woodcut from Hans Folz, Spruch von der Pestilenz. Nuremberg, 1482.

Christ in judgement, with the Virgin Mary, Saints Sebastian and Roch, and Death with a sickle. Woodcut from P. Culmacher, Regimen... wider die ... Pestelentz. Leipzig, c 1495.

The dance of death. Six woodcuts from a German block book of c 1465. Reproduced from Johannes Nohl, Der schwarze Tod. Potsdam, 1924.

Death and the Pope.

Death and the cardinal.

Death and the physician.

Death and the lawyer.

Death and the nun.

Death and the child.

## PICTURES

### St. Roch

Italian, 16th century. Fresco transferred to canvas (losses replaced in oil-paint) 178 x 68 cms. Iconographic collection 387/1939.

### St Roch and the angel

Anonymous Spanish (?) painter, 17th century, after a painting by Alessandro Bonvicino, called Moretto da Brescia (c. 1498-1554), now in the Szepmuveszety Muzeum, Budapest. Oil on canvas 116.7 x 96 cms. Iconographic collection 27/1939.

### The plague of the Philistines at Ashdod

Pieter van Halen (1612-1687), Antwerp, 1661, signed and dated. Oil on canvas 84.8 x 119.5 cms. Iconographic collection 2113/1938.

### The manufacture of theriac at Bologna

A. Terzi, 20th century, after an 18th century drawing in the Biblioteca Comunale dell' Archiginnasio, Bologna (?). Watercolour on paper, 85.5 x 119 cms.

### Still life with a "dissertation on the plague"

Italian, 1766. Oil on canvas 47 x 61.5 cms. Iconographic collection 2/1980.





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